Notice to Reader.—When you finish reading this magazine, place a 1 cent stamp on this notice, mail the magazine, and it will be placed in the hands of our soldiers or sailors destined to proceed overseas. No wrapping—No Address. *A. S. Burleson, Postmaster-General.*

SCIENCE

NEW SERIES
VOL. XLVIII No. 1227

FRIDAY, JULY 5, 1918

SINGLE COPIES, 15 CTS.
ANNUAL SUBSCRIPTION, $5.00

Whetzel's History of Phytopathology *JUST OUT*

Professor Whetzel divides his subject into five *Eras*, and these in turn into *Periods*. He gives a general survey of each era and each period, crystallizes the evolutionary movement of each, gives interesting biographic sketches of the predominant figures, frequently including portraits.

12mo of 130 pages. By HERBERT HICE WHETZEL, Professor of Plant Pathology at Cornell University, Ithaca, New York. Cloth, $1.75 net.

Prentiss and Arey's Embryology *NEW (2d) EDITION*

This work has been extensively revised and entirely reset. The actual descriptions have been reset and rearranged, a new chapter on the morphogenesis of the skeleton and muscles has been included.

Large octavo of 411 pages, with 388 illustrations. By CHARLES W. PRENTISS, PH.D., formerly Professor of Microscopic Anatomy, and LESLIE B. AREY, PH.D., Associate Professor of Anatomy, Northwestern University. Cloth, $4.00 net.

Arey's Laboratory Histology

Professor Arey treats his subject strictly on an *induction basis*. He leads the student to scrutinize, explain, and reach conclusions *for himself*.

12mo of 81 pages. By LESLIE B. AREY, PH.D., Associate Professor of Anatomy, Northwestern University. Cloth, $1.00 net.

Fred's Soil Bacteriology

The exercises described in this book are arranged primarily for students of soil bacteriology, soil chemistry and physics, and plant pathology. As far as possible the experiments are planned to give *quantitative* results.

12mo of 170 pages, illustrated. By E. B. FRED, PH.D., Associate Professor of Agricultural Bacteriology, College of Agriculture, University of Wisconsin. Cloth, $1.25 net.

Lusk's Science of Nutrition *NEW (3d) EDITION*

Professor Lusk points out why certain diseases are due to metabolic derangements. He teaches you how to correct these derangements. He gives you the very foundation of dietetics—the *fundamentals* upon which a scientific and beneficial dietary regimen may be built. Important chapters are those on food economics, *war rations*, food requirements for various occupations.

Octavo of 640 pages. By GRAHAM LUSK, PH.D., Professor of Physiology, Cornell Medical School. Cloth, $4.50 net.

Lusk's Food in War Time *JUST OUT*

Here you have a practical exposition of the science of nutrition as applied to the daily menu. You are shown how to conserve the food supply, and at the same time preserve efficiency and health. Nutritive values of every-day articles of food are given.

By GRAHAM LUSK, PH.D. 46 pages. Cloth, 50 cents net.

W. B. SAUNDERS COMPANY Philadelphia and London

Spencer Microscopes
Nos. 44 and 64

Embody a side-fine adjustment (the critical mechanical part of any microscope) of superior type:

I. Simplest—fewer parts—less to get out of order.

II. 34 threads of the screw engaged as compared with the equivalent of but **one** in the others.

III. It has a "lateral travel"—an index to its position, relative to its limits.

IV. It is fool-proof durable. It cannot be forced beyond its limits—steel stops prevent.

These advantages are the result of our many years of pioneering in side-fine adjustment construction.

Catalog sent on application

SPENCER BUFFALO U.S.A.

SPENCER LENS COMPANY

BUFFALO, N. Y.

SPENCER BUFFALO U.S.A.

Marine Biological Laboratory

Woods Hole, Mass.

INVESTIGATION
Entire Year

Facilities for research in Zoology, Embryology, Physiology and Botany. Seventy-six private laboratories, $100 each for not over three months. Thirty tables are available for beginners in research who desire to work under the direction of members of the staff. The fee for such a table is $50.00.

INSTRUCTION
July 3 to August 13, 1918

Courses of laboratory instruction with lectures are offered in Invertebrate Zoology, Embryology, Physiology and Morphology and Taxonomy of the Algae. Each course requires the full time of the student. Fee, $50. A lecture course on the Philosophical Aspects of Biology and Allied Sciences is also offered.

SUPPLY DEPARTMENT
Open the Entire Year

Animals and plants, preserved, living, and in embryonic stages. Preserved material of all types of animals and of Algae, Fungi, Liverworts and Mosses furnished for classwork, or for the museum. Living material furnished in season as ordered. Price lists of Zoological and Botanical material sent on application. State which is desired. For price lists and all information regarding material, address

GEO. M. GRAY, Curator, Woods Hole, Mass.

The annual announcement will be sent on application to The Director, Marine Biological Laboratory, Woods Hole, Mass.

Cooking Class at the South Dakota State College

are using gas made by

The "Detroit" Combination Gas Machine

for supplying gas in Departments of

Domestic Science
Chemistry and Physics

(Over 30,000 in daily use)

Laboratory work can be done better, quicker and cheaper by using this gas.

Ask for descriptive catalog and names of users in your vicinity.

Detroit Heating & Lighting Co.

612 Wight St. **Detroit, Mich.**

Est. 1868

SCIENCE

FRIDAY, JULY 5, 1918

CONTENTS

The American Association for the Advancement of Science:—
Contributions of Zoology to Human Welfare: PROFESSOR MAURICE H. BIGELOW 1

Scientific Events:—
Volcanoes of Hawaii; The Division of Gas Warfare of the War Department; War Activities of the U. S. Coast and Geodetic Survey; Magnetic Observations 5

Scientific Notes and News 8

University and Educational News 10

Discussion and Correspondence:—
Meade Cotton: DR. O. F. COOK. *International Zoology and the International Code:* N. HOLLISTER. *Helping to stabilize Nomenclature:* S. A. ROHWER. *Marine Tertiary Horizon in South America:* CARLOTTA J. MAURY. *The Panama Slides that were:* DONALD F. MACDONALD. *A Country without a Name:* PROFESSOR ELLEN HAYES 11

Scientific Books:—
Haas on the Chemistry of Plant Products: PROFESSOR HENRY KRAEMER 15

Scalariform Pitting: FORREST B. H. BROWN. 16

The Origin of Dicotyls: DR. G. R. WIELAND .. 18

Special Articles:—
The Regulation of Blood Volume after Infusions of Solutions of Various Salts: DR. ARTHUR H. SMITH 21

The Iowa Academy of Science: DR. JAMES H. LEES 22

MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

CONTRIBUTIONS OF ZOOLOGY TO HUMAN WELFARE[1]

MY colleagues in this symposium have emphasized the important contributions to human welfare which have come from zoological research and the application of the resulting discoveries. On the contrary, I shall tend to stress the contributions which biology, and in particular zoology, may make through education which aims to extend scientific knowledge to everybody. Moreover, my colleagues have chosen to speak concerning the contributions of zoology to human welfare in lines which are directly useful with reference to the physical well-being of the human race. Hence they have emphasized the practical bearings of zoological science in its applications to the production of useful animals and plants and in the relations of certain animals to human health. In short, a strong case has been made for zoology as a science which has immensely important contributions to the economic and hygienic welfare of the human race. With all this emphasis on zoology in its direct material or physical bearings on human life, I most heartily agree. As a matter of education, I believe in "applied zoology" which stresses the science of animals as they economically or hygienically affect mankind; but I regard zoology limited to its direct material usefulness, to its contributions to physical human welfare, as failing to develop the possibilities of the science as it may affect racial welfare and intellectual welfare. Hence, I have devoted my paper to zool-

[1] Read by title before Section F, American Association for the Advancement of Science at Pittsburgh, December, 1917.

ogy (1) as it concerns human intellectual welfare and (2) as it concerns racial welfare.

I. BIOLOGY AND INTELLECTUAL LIFE

One who studies critically the educational essays of the pioneer educator-biologist, Thomas Henry Huxley, must be deeply impressed with the important relations and possible applications of biology to daily life. In Huxley's remarkable address, "The Educational Value of the Natural History Sciences," delivered in 1854, and in those maturer ones, "On the Study of Biology," in 1876, and "Science and Culture," in 1880, Huxley grasped the vast significance of biology in relation to human life at the fullest development of its physical, intellectual, ethical, moral, and esthetic possibilities. Looking, as he always did, at human life and science and education with a far-reaching vision, Huxley needed for his own estimate of the value of science no such a sharp distinction between pure science and applied science as has become common in these later years. To most educated people to-day the terms "applied science" or "practical science" suggest some phase of technology, such as industrial chemistry, or electrical engineering, or scientific housekeeping, or modern agriculture, or hygienic problems; in short, applied science now commonly means the use of science in the material or physical affairs of life. Rarely indeed do we now find educational discussions which consider science as applicable to the intellectual and emotional aspects of the life of educated citizens. No such a limited view of applied science appealed to Huxley. He saw clearly many applications of science, and of biology in particular, to the intellectual and emotional aspects of life in addition to the physical or material welfare to which he often gave appropriate emphasis. I refer especially to his lecture "On the Study of Biology," only one of many lectures in which he showed that to him biology had an applied or practical bearing on our lives through the intellectual or philosophical problems which evolution and other scientific doctrines have forced to the attention of most well-educated people. Huxley illustrated his view of the higher intellectual value of biology as applied science by pointing out the great significance to intelligent people of the evolutionary theory of man's relation to nature. Evidently, this theory has nothing to do with biology applied to the material affairs which affect our physical welfare, for it is of no value in hygiene, agriculture, or other practical applications of biology; but I think that most of us will agree that courses which do not open up for students the great intellectual value of evolution and other biological theories do not deserve to be named either pure biology or applied biology. In fact, I have come to believe that no phase of biology which has a purely physical application to human welfare, such as bacteria and disease, or biology applied to agriculture, is more important for the *average* educated citizen than a general understanding of the evolution theory. Hence, I urge that our conception of applied biology for general education must be large enough to include the intellectual as well as the more directly practical aspects which affect human welfare economically and hygienically.

Summarizing Huxley's views of biology as applied science, biological knowledge is practical, utilitarian and applicable to human welfare (1) in many lines (*e. g.*, agriculture) which are industrial or economic, (2) in hygienic problems aiming at life conservation, (3) in esthetic outlook upon nature in general, and (4) in intellectual or philosophical interpretations of human life in its relations to nature. It is such an ex-

tended outlook upon biology as applied science in the larger sense that we now need for the purposes of general and liberal education. We are living in an age that is eminently industrial, commercial and practical. There are signs that we tend to consider education as productive of results measurable in purely material terms. If we follow closely such tendencies while we are reorganizing biology into applied science, we are likely to interpret the word "applied" as limited to the material and especially the commercial affairs of life, and then we shall leave no place for the intellectual and esthetic values of biological study.

I have thus at some length advocated a larger conception of biology as applied science that functions in our daily life in that it definitely concerns intellectual welfare. This is why I believe in education that present applied biology in the largest sense of the word "applied," namely, biology that sets forth in bold relief the great facts and leading ideas which touch human life in its combined economic, industrial, hygienic, intellectual and esthetic outlook. Applied biology, then, should be understood in the larger sense as meaning a selection from the vast field of biological learning of those facts and ideas which are likely to mean most in the life of the average educated man and woman. Thus, zoology may through education come to make the greatest possible contribution to human welfare.

There has long been a feeling, even among scientific men themselves, that the philosophical applications of biological generalizations are more or less interesting for the purposes of mental gymnastics; but that they have no important bearing on the practical relations of science to human life. How often have we heard the theory of evolution referred to as a strictly pure science generalization without possible application to practical affairs. In all this we seem to have been decidedly in error, for we have overlooked the fact that a philosophical application of a pure-science theory may come to be a guiding force in the material affairs to which science is directly applied. Such is the case in the relation of certain phases of evolutionary philosophy to the Great War.

A striking illustration of the profound bearing of philosophical biology, particularly zoology, on human welfare is found in the German justification of the present world struggle which seems to be opening the way to overwhelming revolutions of our economic, social, political, ethical and even religious systems. It is clear to many American men of science that the German philosophy of the superior state or nation and the superior race or people and the superior qualities of Kultur of the people as a group is at bottom an evolutionary philosophy based on the German zoologist's conception of the Allmacht or all-sufficiency of the Darwinian theory of survival of the fittest in the universal struggle for existence among living things. This biological principle in the extreme interpretation of Neo-Darwinism has been widely adopted by influential German philosophers.

Of course the German doctrine of superiority is not all an application of philosophical biology, for there is obviously an admixture of the peculiar religious state of mind characteristic of many German writers in the universities and in the government. As proof of this we may call to mind the long-standing dual alliance between the Kaiser and his Gott; and judging from many fervently religious phrases in imperial proclamations relating to "glorious" victories in Belgium and Serbia, the mutual understanding between Wilhelm II., and his invisible and silent partner continues to exist. However, we must not allow the religious attitude of those at the center of

the Hohenzollern dynasty to lead us to believe that religion is the determining factor in establishing the prevailing German attitude regarding war as the justifiable method of extending their assumed superiority. The members of the Kaiser's family may sincerely believe, because they have been educated to believe, in their divine rights and affiliations; but it is impossible that traditional religion has played more than a minor part in developing the clearly evolutionary philosophy of German superiority that has spread centrifugally from the universities, especially through the influence of many writers who were not liable to classification as religiously inclined. Perhaps the religion of the people of the masses has led them to accept as a religious idea the doctrine of superiority made by German evolutionary thinkers and spread broadcast by the means of an educational system that with marvelous skill was planned to promulgate and ultimately to put into world-wide practise the clearly evolutionary doctrine of German superiority over the rest of mankind.

In biological philosophy intellectual Germany seems to find good in this war, and indeed in all wars, as a means of expressing force or might of the state, which in the German national philosophy is always right because the fittest win in the struggle.

Of course it matters not, so far as we are inquiring into the possible influence of biological philosophy on human welfare, that numerous German biologists and philosophers have accepted an evolution factor whose Allmacht has long been denied by the great majority of biologists outside of Germany. For our present purposes the fact is that, whether right or wrong, a biological theory has been made to support a national state of mind which is now threatening the very foundations of human welfare. Of course it is beside the point, but to a biologist an interesting question, whether Neo-Darwinism has been widely accepted by the intellectuals of Germany because of scientific facts in its favor or because it fitted in with a previously accepted doctrine of right determined by might. Be that as it may, the one conclusion I wish to draw from the German philosophy of superiority is that we should find an important lesson in the fact that a theory largely zoological in its origin and in its human applications has been brought into conflict with human welfare as we Americans see it with the larger vision.

I have arrived now at my main thesis that only through organized education can the physical and intellectual values of zoology be made to contribute to human welfare in the largest sense. The fact that the German superior state of mind to which we object was developed by national education, and education thus worked against human welfare, is obviously no argument against education, but only against a phase of education limited to the purposes of those in power.

II. ZOOLOGY AND EUGENICS

I come now to the relation of zoology to racial welfare, in other words, the problem of eugenics. It is evident that the application of the laws of heredity or genetics to the breeding of more useful animals is simply another aspect of economic zoology; and one whose total financial value is bound to continue to be greater than that of all other phases of practical zoology combined. We need only compare in cursory survey any of our valuable cultivated or domesticated strains of the animals and plants of agriculture with the most closely related wild forms in order to realize the vast economic significance of man's applications of known and unknown principles of heredity.

On the other hand, the human problem of applied heredity or eugenics is far from being such a simple business problem because the desired results can not be evaluated on a purely economic basis. In short, eugenics, unlike the biologically parallel breeding of animals and plants, is not a phase of economic zoology, except perhaps in the indirectly involved economic problems arising from human defectives and inefficients. Eugenics is at present a biological philosophy and must be developed and promulgated accordingly, namely, through education. As the biologist so well realizes, the production of better human strains involves not only the physical problems of heredity but also the vastly more complicated social, emotional and religious traditions which concern human families as they are organized to-day. Before established biological principles of heredity can be applied to the human race, either by individuals or by nations, a eugenic philosophy must be accepted. This is the next and necessary step in the program of the eugenic movement. More research may bring stronger conviction that the eugenic proposals are scientifically true; but little progress can be made except through an educational movement which distributes widely among intelligent people a eugenic philosophy which deals adequately with the biological, social and other factors involved. Such an educational movement for eugenics must be based on biology, and especially on zoology which more directly illustrates human life and its problems. By education I do not mean schools and colleges only, for I am thinking of the vast possibilities of popular education such as in the past year has been applied by lectures, magazines, newspapers, pamphlets and posters to the great food questions. An energetic and sweeping educational campaign will some day be necessary if the average intelligent citizen is to be made to realize what the eugenic proposition may mean for racial welfare. Here is a possible contribution of zoology to human welfare compared with which all others are of minor importance. As in the case of those philosophical principles of biology which may profoundly influence human thought and action, there is now in sight only one pathway leading towards progress in applying the established biological science to eugenic practise. That pathway is labelled "Education."

MAURICE H. BIGELOW
TEACHERS COLLEGE,
COLUMBIA UNIVERSITY

SCIENTIFIC EVENTS

VOLCANOES OF HAWAII

THE entire group of Hawaiian Islands, twenty in number, extending in a chain for hundreds of miles, is of volcanic origin, though some of the islets and reefs are but the wave-battered remnants of volcanoes whose fires died out long ago. The island of Hawaii has been formed by the coalescence of many recently formed volcanoes. The walls of the crater of the active volcano of Kilauea, on this island, are broken down on one side, giving access to its "lake of fire." This volcano has not always been gentle in its ways, but it is now so well behaved that the visitor can stand safely on the edge of its fiery pit and, if the volcano is active, watch the molten rock boiling and spouting 100 to 300 feet below. Sometimes many fountains throw up jets of glowing sulphurous lava and light up with ghastly glare the frowning crags that rim the crater. Then, suddenly and with deafening detonations, the jets rush together and convert the lake into a burning, seething, roaring mass, making a scene to which few others in the world are comparable.

Mauna Loa, on the island of Hawaii, and a neighboring volcanic cone, Mauna Kea, both nearly 14,000 feet above the sea, are among the highest island mountains in the world. On

the other islands of the Hawaiian group there are volcanic mountains scarcely less interesting. The crater of Haleakala, in the summit of East Maui, 10,000 feet above sea level, is one of the largest extinct craters in the world and is as well preserved as if its fires had been extinguished but a few years, instead of perhaps several hundred years ago.

The active volcanoes of Hawaii give a wonderful demonstration of the processes by which all these island mountains have been built up from the great depths of the ocean. Since the days of Captain Cook, geologists and others who are interested in the problems of volcanoes have visited the Hawaiian Islands and written about them.

Near the base of these mountains of igneous rock lie fields of sugar cane, which are just now of special interest. They are supplied with water from mountain streams and from wells and drainage tunnels that tap underground supplies. The Geological Survey, in cooperation with the Territory of Hawaii, has for several years been studying the water resources of the islands with a view to increasing the amount of water available for use in irrigation, and therefore in the output of sugar and other crops.

Several publications giving information on special phases of these interesting islands will be sent free on application to the Director of the United States Geological Survey, Department of the Interior, Washington, D. C. Among these are Water-Supply Paper 318, "Water Resources of Hawaii, 1909–1911," by W. F. Martin and C. H. Pierce, and Water-Supply Paper 336, "Water Resources of Hawaii, 1912," by C. H. Pierce and G. K. Larrison. These papers deal mainly with stream measurements and kindred subjects but contain also much information of general interest. A paper on the water supply of one of the neighboring islands is also available—Water-Supply Paper 77, "The water resources of Molokai, Hawaiian Islands," by Waldemar Lindgren. This paper contains an excellent map of the island.

Professional Paper 88 of the United States Geological Survey, Department of the Interior, "Lavas of Hawaii and their relations," by Whitman Cross, presents a summary of our present scientific knowledge of the lavas of the islands. With the exception of the introduction the book is mainly technical. It contains 97 pages and includes an excellent map of the Hawaiian Islands and diagrams showing the composition of the lavas.

THE DIVISION OF GAS WARFARE OF THE WAR DEPARTMENT

By direction of President Wilson all the activities of the government concerned with manufacturing poison gas for war and experimenting in the work of devising new methods were transferred to the control of the War Department on July 1.

The entire gas experimental work will be under the direction of Major General William L. Sibert, who recently returned from France, where he commanded the First Division of the regular army, and was assigned as chief of a special department on gas defense.

President Wilson has signed an order transferring the chemical section of the Bureau of Mines of the Department of the Interior to the War Department in accordance with the President's decision that measures for the use of gas as a weapon of offense and defense should be coordinated under the War Department. Experiments on war gas and masks have been divided among several branches of the government, including the Ordnance and Medical Departments of the army.

The most extensive work has been conducted by the Bureau of Mines, which established a special chemical laboratory at the American University on the outskirts of Washington. About 1,700 American chemists have given the government the benefit of their advice, experience, and services in this work, and important results are predicted.

Among the chemists whose services have been utilized by the Bureau of Mines in its Chemical Section in the gas experimentation are Dr. William H. Nicolls of 25 Broad Street, New York, President of the General Chemical Company; Dr. F. C. Venable, of the University of North Carolina; Professor E. C.

Franklin, of Leland Stanford University; William Hoskins, chemical engineer of Chicago; Professor H. P. Talbot, of the Massachusetts Institute of Technology, Dr. Ira Remsen, president emeritus of Johns Hopkins University; Professor F. W. Richards, of Harvard; Dr. Charles L. Parsons, of the Bureau of Mines; Dr. Reed Hunt, of Harvard; Professor W. D. Bancroft, of Cornell; Professor A. B. Lamb, of the Havemeyer Laboratory, New York University; W. K. Lewis, Chemical Engineer of the Massachusetts Institute of Technology; Professor C. A. Hulett, of Princeton; Yandell Henderson, of the Yale Medical School, and Dr. F. B. Underhill, of Yale.

In a letter dated June 26 to Dr. Van H. Manning, chief of the Bureau of Mines, notifying him of the coordination of war gas experimental work in the War Department, President Wilson wrote as follows :

I have had before me for some days the question presented by the Secretary of War involving the transfer of the chemical section established by you at the American University from the Bureau of Mines to the newly organized Division of Gas Warfare, in which the War Department is now concentrating all the various facilities for offensive and defensive gas operations. I am satisfied that a more efficient organization can be effected by having these various activities under one direction and control, and my hesitation about acting in the matter has grown only out of a reluctance to take away from the Bureau of Mines a piece of work which thus far it has so effectively performed. The Secretary of War has assured me of his own recognition of the splendid work you have been able to do, and I am taking the liberty of inclosing a letter which I have received from him in order that you may see how fully the War Department recognizes the value of the services.

I am to-day signing the order directing the transfer. I want, however, to express to you my own appreciation of the fine and helpful piece of work which you have done, and to say that this sort of teamwork by the bureaus outside of the direct war-making agency is one of the cheering and gratifying evidences of the way our official forces are inspired by the presence of a great national task.

WAR ACTIVITIES OF THE U. S. COAST AND GEODETIC SURVEY

BY executive order dated May 16, 1918, the President transferred to the service and jurisdiction of the Navy Department for temporary use the Coast and Geodetic Survey steamers *Patterson* and *Explorer,* including their equipment and personnel other than commissioned officers. These vessels have been employed for many years in surveys on the Pacific coast and chiefly on the coast of Alaska.

Since the beginning of the war the work of this bureau has been almost entirely for military purposes. Five vessels, three on the Atlantic and two on the Pacific coast, have been transferred to the Navy, and about twenty-three per cent. of the personnel has been transferred to some branch of the military service. Of the remaining force most of the field officers are engaged in land or hydrographic surveys for the Army or Navy, and a large portion of the office force is employed in reducing and publishing the results thus obtained.

A very important part of the office work is the preparation and production of charts, coast pilots and tide tables for vessels of the Navy and Merchant Marine, including those operated by the Shipping Board, the Railroad Administration, the Coast Guard and the Bureau of Lighthouses. The officers of the Survey are trained in work of triangulation, precise leveling, astronomic work, hydrographic surveying and chart construction, and are particularly available for service as navigation officers in the Navy and for duty with the Corps of Engineers, the Artillery Corps and the Aviation Service of the Army.

MAGNETIC OBSERVATIONS

THE various parties sent out by the Carnegie Department of Terrestrial Magnetism and the United States Coast and Geodetic Survey, have all reported securing successful series of magnetic observations during the time of the total solar eclipse of June 8. Magnetic observations were made by the Coast and Geodetic Survey at Green River, Wyo., Mena, Ark., and Orlando, Fla. In addition data will be obtained from the various magnetic observatories of the Coast and Geodetic Survey.

The stations at which magnetic observations were made by the observers of the Department of Terrestrial Magnetism were: Goldendale, Wash.; Corona, Colo.; at an altitude of 12,000 feet; Moraine Lake, Colo.; Lakin, Kans.; Brewton, Ala., and Washington, D. C. At Lakin, furthermore, and at Washington, D. C., atmospheric-electric observations were made. Reports on the results obtained will be published in the September issue of the journal *Terrestrial Magnetism and Atmospheric Electricity*. At various universities also series of magnetic observations were obtained and data will likewise be furnished by the Canadian magnetic observatories.

The magnetic survey vessel *Carnegie* arrived safely at her home port, Washington, D. C., on June 10, where she will be put out of commission probably during the period of the war. During her cruise from Buenos Aires, Argentina, around The Horn to Valparaiso, Chile, Callao, Peru, thence through the Panama Canal to Newport News, she was in command of Dr. H. M. W. Edmonds; the other members of the scientific staff aboard were: Messrs. A. D. Power, Bradley Jones, L. L. Tanguy, J. M. McFadden, and Walter E. Scott.

SCIENTIFIC NOTES AND NEWS

Dr. Theodore W. Richards, Erving professor of chemistry and director of the Wolcott Gibbs Memorial Laboratory at Harvard University, has been made a foreign member of the Accademia dei Lincei, Rome. He has been elected an honorary member of the Royal Irish Academy.

Sir James Dewar has been awarded the medal of the Society of Chemical Industry in recognition of the conspicuous services which, by his research work in both pure and applied science, he has rendered to chemical industry.

The French Geological Society has awarded the Conrad Ealte-Brun prize to Professor Lawrence Martin, of the University of Wisconsin, for his studies on the glaciers of Alaska.

Dr. Victor C. Vaughan, of the University of Michigan, and Dr. George E. Crile, of Western Reserve University, have been promoted to the rank of Colonel in the Medical Corps of the National Army.

Dr. Leonard P. Ayres has been made a colonel and is attached to General Pershing's staff in France. Dr. Ayres has had charge of the statistical work of the War Department in Washington.

Captain Paul H. DeKruif, Ph.D. (Michigan), has been ordered to return to the United States for the purpose of making special investigations on gas gangrene. Captain DeKruif has been in France for some months studying at the Pasteur Institute in Paris. He expects to remain in this country for about three months, when he will return to France.

Supervisory authority over several of the largest explosive manufacturing plants in the country has been granted to Professor Arthur H. Hixson, of the chemistry department at the University of Iowa. He holds the position of consulting chemical engineer in the ordnance department.

Dr. Arthur Carleton Trowbridge, of the geology staff of the State University, for the past few months in charge of the work at Camp Dodge, has been called to New York to take a place on the national war work council of the Y. M. C. A.

Dr. Chas. W. Burrows, associate physicist of the National Bureau of Standards in charge of the magnetic section of that institution, has resigned and will take up the work of commercial research and consultation, with laboratories equipped for research on problems involving magnetic materials and apparatus located at Grasmere, Borough of Richmond, New York City.

Dr. Vern B. Stewart, of Cornell University, has accepted an appointment in the Bureau of Plant Industry, and is at present engaged in work on the pathological aspects of markets inspection of vegetables.

Mr. H. J. Morgan, of the General Chemical Company, has been transferred from the Delaware Works at Marcus Hook, Pa., to the main laboratories of the company at Laurel Hill, Long Island, where he will be chemist in charge.

MISS MILDRED P. STEWART has resigned her position as instructor in physiology and chemistry at Pratt Institute, Brooklyn, N. Y., to take charge of the work of the Dutchess County (N. Y.) Public Health Association, with headquarters at Poughkeepsie, N. Y.

IT is stated in *Nature* that the British minister of munitions, in agreement with the secretary of state for the colonies and the petroleum executive, has appointed a committee to inquire into certain matters relating to the production of fuel oil from home sources. The terms of reference are: "To consider the report which has been rendered by the Petroleum Research Department on the production of fuel oil from home sources, and to advise to what extent, and within what time, it should be possible under present conditions to carry out the proposals made in this report; and to consider the steps which have been taken by the Ministry of Munitions in this connection." The members of the committee are: Marquess of Crewe (chairman), Colonel A. Stirling, Major G. Collins, Engineer Vice-Admiral G. G. Goodwin (Engineer-in-Chief of the Navy), Sir Richard Redmayne (representing the Controller of Coal Mines), Sir Lionel Phillips (representing the Ministry of Munitions); secretary, Mr. G. C. Smallwood (Ministry of Munitions).

THE British Army Medical Advisory Board, established in 1901 has been in abeyance since the beginning of the present conflict. We learn from the *British Medical Journal* that it has now been considered advisable to appoint a new advisory board somewhat differently constituted and with a smaller number of members. The Director-General, Lieutenant-General T. H. J. C. Goodwin, is president, and the other members are Major-General Sir Bertrand Dawson, Major-General Sir Berkeley Moyniham, Colonel W. H. Horrocks, Colonel Sir Robert Jones and Lieutenant-Colonel Sir Harold J. Stiles. Sir Bertrand Dawson, who is physician to the London Hospital, is a consulting physician with the British Expeditionary Force in France. Sir Berkeley Moynihan, who is surgeon to the Leeds Infirmary, is consulting surgeon to the Northern Command. Sir Robert Jones is the Inspector of Military Orthopedics, and Sir Harold Stiles, of Edinburgh is assistant inspector of Military Orthopedics for Scotland and was a member of the commission of inquiry in France. Colonel Horrocks, who was a member of the old board, again serves on the new board as sanitary expert. The secretary is Mr. A. T. Gann, who was the secretary of the old board. It will observed that the new board does not contain, as did its predecessor, representatives of the India Office and of the directorates of military operations and of fortifications and works.

MR. D'ARCY POWER has been appointed Bradshaw lecturer of the Royal College of Surgeons of England for the ensuing year.

THE annual Halley lecture at Oxford University was delivered on May 28 by Sir Napier Shaw, director of the Meteorological Office. The subject was "The first chapter in the story of the winds

DR. WILLIAM MECKLENBURG POLK, professor of gynecology and dean of Cornell Medical School, died on June 24, in his seventy-fourth year.

ALBERT MCCALLA, Ph.D., a past-president of the American Microscopical Society and of the Illinois Microscopical Society, died on June 6, aged seventy-two years.

TITLES of articles upon physiological subjects, both plant and animal, which are not published in the regular journals devoted to such studies are solicited by the *Physiological Abstracts*. Authors may send titles to Dr. Withrow Morse, 2900 Ellis Avenue, Chicago.

FREE public lectures have been delivered in the lecture hall of the Museum building of the New York Botanical Garden, Bronx Park, on Saturday afternoons, at four o'clock, as follows:

April 6. "How to prepare the soil for gardening," by Mr. J. G. Curtis.

April 13. "Vacant lot gardens," by Carl Bannwart.

April 20. "Tree-planting for forests," by Professor S. W. Allen.

April 27. "Home gardens," by Henry G. Parsons.

May 4. "Drug plants and their cultivation," by Dr. H. H. Rusby.

May 11. "How to grow fruits in limited areas," by Professor M. A. Blake.

(Exhibition of Flowers, May 11 and 12)

May 18. "Fiber plants and their cultivation," by Lyster H. Dewey.

May 25. "Women as gardeners," by Delia W. Marble.

June 1. "Diseases of garden crops and their control," by Dr. Mel. T. Cook.

June 8. "Insect pests and their control," by Dr. F. J. Seaver.

The following lecture course was given by the Illinois Audubon Society during March. March 9, Ernest Harold Baynes, Meriden, N. H., "Birds in the nesting season." March 16, Norman McClintock, Pittsburgh, Pa., "Moving pictures of wild birds and animals." March 23, Edward Howe Forbush, Boston, Mass., "How birds help to win the war." March 30, Louis Agassiz Fuertes, Ithaca, N. Y., "Birds and their conservation."

It is related in *Nature* that the staff of the Natural History Museum, London, has been of assistance to various public departments in connection with the war. The following are examples of some of the questions which its members have been asked to answer: (1) nature of some organisms which caused blocking up of certain sea-water pipes; (2) as to some mite-infested oats at the front; (3) application of a remedy for the rice weevil in connection with the disease of beriberi; (4) as to methods of destruction of bedbugs; (5) the identification of specimens of larvae found in drinking water; (6) nature of wood used in the construction of a propeller of a Zeppelin brought down in this country; (7) inquiries as to certain wood stated to possess luminous properties; (8) questions arising out of the Canadian commission to consider the alleged depredations of sea lions on the Pacific coasts of North America, in connection with the fishing and canning industries; (9) identification of certain animal forms of tinned food, such as Pacific lobsters, sardines or sprats; (10) the identification of poisonous fishes in the West Indies; (11) the sponge fishery in the West Indies, and (12) the introduction of reindeer and other animals into South Georgia.

The Osiris prize of the value of $20,000 was founded for the recognition of the most important discovery or work in science, letters, arts, industries, or generally anything for the public benefit. The prize has been held in abeyance since the beginning of the war, but the Institute of France has decided to make an award this year.

Professor Henry Chandler Cowles, of the department of botany at the University of Chicago, recently gave the annual address at Iowa State College for the national honorary societies Phi Kappa Phi and Gamma Sigma Delta.

The Royal Society of Canada recently closed its thirty-seventh yearly meeting at Ottawa, Canada. There was an unusually large number of papers presented in all sections of the society, including those in the mathematical, physical and chemical, as well as the biological and zoological sciences. Abstracts of papers and discussions are expected in a forthcoming issue of Science.

It is announced in *Nature* that Mr. W. B. Randall of Waltham Cross, has generously provided funds for the establishment of a new research post at the Rothamsted Experimental Station, and the committee has appointed Mrs. D. J. Matthews (formerly Miss Isgrove) to occupy it. Mrs. Matthews will devote herself to the study of some of the problems connected with soil sterilization as it is now being carried out in certain types of nurseries.

On the initiative of Professor Gradenigo stations of psycho-physiological research on the effects of aviation have lately been founded at Turin and Naples. They are chiefly intended for the examination of candidates for service as air pilots.

UNIVERSITY AND EDUCATIONAL NEWS

Congress has passed a vocational training bill which, carrying an appropriation of $2,000,000, provides for an elaborate system of educating soldiers in trades. It provides for the teaching of more than 300 vocations. While a soldier is undergoing training he is to

receive army pay; he is free to accept or reject the training.

DR. WILLIAM ALLAN NEILSON was installed as president of Smith College on June 13. Because of war conditions other educational institutions were not asked to send representatives.

B. R. BUCKINGHAM has been appointed head of a bureau of research which forms a part of the newly established college of education of the University of Illinois.

DR. A. R. BAILEY, assistant professor of engineering at the University of Michigan, has resigned.

DURING the past year Professor Leo F. Rettger, of Yale University, gave the course of lectures in general bacteriology at Wesleyan University which for many years was one of the regular courses conducted by the late Professor H. W. Conn.

DISCUSSION AND CORRESPONDENCE

MEADE COTTON

THIS name has been given to a new Upland long-staple variety representing the nearest approach to Sea Island cotton in length and fineness of fiber. The original selection was made in 1912 at Clarksville, Texas, in a field of a variety locally called "Blackseed" or "Black Rattler," but not the same as the varieties that have borne these names in other parts of the cotton belt. The possibility of securing from this stock an Upland variety that would rival the Sea Island in length and fineness of staple appealed very strongly to Mr. Rowland M. Meade, at that time an assistant in cotton breeding in the Bureau of Plant Industry, and his enthusiasm now appears fully justified by the results of the work that he began.

Three generations of progenies from select individuals had been raised and a superior stock had been separated before the sudden and untimely death of Mr. Meade at San Antonio, Texas, in June, 1916, at the age of twenty-seven. The new variety has been called Meade as a tribute of personal regard of his associates, and to commemorate his services as a plant breeder. Though his work ended at an age when men are supposed to be prepared only to begin such investigations, he had studied cotton intensively for more than a decade and had made notable contributions to our knowledge of the habits of the plant and to the breeding of superior varieties.

Brief statements regarding the Meade variety have appeared in the current annual reports of the chief of the Bureau of Plant Industry and of the chief of the Bureau of Markets. Tests of the strength and spinning qualities of the fiber have given favorable results, so that the possibility of substituting this type of cotton for corresponding lengths of Sea Island is definitely indicated. The length of staple equals or may slightly exceed much of the "mainland" Sea Island crop of Georgia and Florida, Meade fiber under favorable conditions being usually about $1\frac{1}{2}$ inches, seldom falling below $1\frac{7}{16}$, and sometimes attaining $1\frac{3}{4}$. There is little tendency to "butterfly," that is, to shorten the fibers at the base of the seed, which was one of the undesirable traits of the older long-staple varieties, such as Floradora, Sunflower and Allen.

When compared with Sea Island in adjoining rows or plots, the cultural superiority of the Meade cotton is clearly shown. It produces earlier and more abundant flowers, the bolls are nearly twice as large, a heavier crop can be set in a short period, and the fiber matures in advance of the Sea Island, all tending to avoid damage by the boll weevil. Even when a large proportion of the buds or young bolls are shed, as a result of severe weevil injury or other unfavorable conditions, the Meade rows often yield two or three times as much as the Sea Island. And since buyers are accepting the Meade fiber as practically equivalent to the Sea Island the advantage to the farmer is clear. Some of the 1917 crop of Meade cotton was sold for 73 cents on the Savannah market.

Substitution for the Sea Island is also facilitated by the fact that the seeds of the Meade cotton do not have a dense covering of fuzz like most of the Upland varieties, but are naked on the sides like the seeds of the Sea Island and Egyptian cotton, so that it is pos-

sible to use the roller gins with which the Sea Island growers are already equipped. The only difficulty arises from the fact that the Meade seeds average somewhat larger than the Sea Island, but this can be avoided by a slight modification of the ginning equipment.

Another consequence of the larger size of the seeds is that the percentage of lint is lower than with some of the Sea Island varieties, although the lint index, the number of grams of lint produced by 100 seeds, is higher. Thus a sample of Meade cotton with a lint percentage of 26.6 had a lint index of 5.45, while Sea Island cotton with a percentage of 30.7 had an index of 4.93. In addition to producing more lint per acre the Meade cotton produces more seed than the Sea Island, the increase being at the rate of about 250 pounds of seed for each 500-pound bale. In such cases the popular idea of the supreme importance of the lint percentage is clearly erroneous.

That the Meade variety was not produced by hybridization, but by the discovery and selection of a superior type already existing, is of interest in relation to heredity. Confusion is likely to arise, as already shown by unauthorized statements appearing in newspapers and agricultural journals, in which the Meade variety appears as a new early Sea Island cotton or as a hybrid between the Upland and Sea Island types. The usual reasoning in such matters is to assume that a variety like Meade must be a hybrid because the plant is like Upland cotton and the lint like Sea Island, but the uniformity of the Meade cotton at once places it in a different class from any stock known to have a direct hybrid origin.

The need of combining the superior fiber of the Sea Island or Egyptian types of cotton with the superior cultural characters of the Upland type has appealed strongly to breeders, and many attempts have been made to secure this result by hybridizing different Upland varieties with Sea Island or Egyptian sorts. Crossing is readily accomplished and the results usually appear promising in the first and second generations. Thousands of natural and artificial hybrids have been raised, compared, and selected, and progenies of such hybrids have been carried through numerous generations, but without finding any hybrid stock with a sufficiently uniform and stable combination of the desirable characters of the parental types to justify commercial planting. While it is doubtless true that need of uniformity is greater with cotton than with many other crops, on account of the industrial uses of the fiber, the failure to secure sufficiently stable combinations of characters from hybrids between widely different types may be significant.

O. F. Cook

Bureau of Plant Industry,
U. S. Department of Agriculture

INTERNATIONAL ZOOLOGY AND THE INTERNATIONAL CODE

Discussion of the famous Piltdown jaw has developed one of the best examples imaginable of evil due to a disregard for established rules of zoological nomenclature. The great interest shown in this specimen by men other than professional zoologists makes the case a particularly good one on which to base an earnest plea for universal use of the International Code without restrictions and evasions. Three comparatively late papers on the Piltdown remains are enough to cite in the present connection.

Miller,[1] in describing the jaw as the type specimen of a new species of extinct chimpanzee, called it *Pan vetus*. Pycraft,[2] in a totally adverse reply to Miller, attempts to set his readers straight in matters of nomenclature by the statement that "when Mr. Miller speaks of the genus *Pan* he means the genus *Simia*." Boule[3] in a review of Miller's paper in which he agrees with that author in every detail except nomenclature, uses for the chimpanzee the generic name *Troglodytes*.[4]

[1] Smithsonian Misc. Coll., Vol. 65, No. 12, November 24, 1915.

[2] *Science Progress*, No. 43, pp. 389–409, January, 1917.

[3] *L'Anthropologie*, Vol. 28, pp. 433–435, July–October, 1917.

[4] More expansive than Pycraft, he explains as follows: "Pour ceux de mes lecteurs qui ne serai-

Here we have three authors, writing about one specimen and using three generic names for the chimpanzee. The subject is further complicated by the action of a group of European mammalogists who have petitioned the International Commission on Zoological Nomenclature to fix the name of the chimpanzee by fiat, not as *Pan, Simia,* or *Troglodytes,* but as *Anthropopithecus.*[5] One of these zoologists, after making his recommendation to the Commission, does not wait for action by that body, but immediately proceeds to use *Anthropopithecus* when he has occasion to mention the chimpanzee in print.[6] Four generic names are thus current for this one ape. One of these names, *Simia,* is applied by Boule to the orang-utan, and the fiat petitioners ask that it be fixed on the same animal; but by some authors, it is correctly applied to still another primate, the Barbary ape.[7] Another name, *Troglodytes,* would mean to most people familiar with generic terms in zoology, past and present, either the gorilla, or a wren.

All this confusion might be avoided if authors would observe the rules of the International Commission on Zoological Nomenclature and use the correct names for these anthropoids, *Pan* for the chimpanzee, *Pongo* for the orang-utan, and *Gorilla* for the gorilla. These names are now well known, and are entirely free from ambiguity.

N. HOLLISTER

ent pas familiarisés avec la nomenclature américaine, je dois dire que nos confrères des Etats-Unis ont récemment débaptisé, sans raisons bien sérieuses, les Chimpanzés et les Orangs. A leurs vieux noms latins, universellement connus et employés, de *Troglodytes* et de *Simia,* ils ont substitué les termes de *Pan* pour les Chimpanzés et de *Pongo* pour les Orangs, sous le prétexte que ce sont là les noms les plus anciennement donnés.''

[5] *Zoolog. Anzeiger,* Vol. 44, pp. 284–286, May, 1914.

[6] *Kungl. Svenska Vet. Akad. Handl.,* Vol. 58, No. 2, pp. 18–27, 1917.

[7] Thomas, *Proc. Zool. Soc. London,* 1911, p. 125; Miller, ''Mamm. Western Europe Brit. Mus.,'' p. vii, 1912; Elliot, ''Review Primates,'' Vol. 2, p. 172, 1913.

HELPING TO STABILIZE NOMENCLATURE

TO THE EDITOR OF SCIENCE: In these days when there are so many workers in the science of entomology, and when many of the workers have had but little experience in the taxonomic side of the science and, therefore, do not realize its requirements and value, it is especially important that the periodicals should have certain definite, recognized policies, which will make it necessary for all authors to so make up their communications that they will contain at least the most of the important, although seemingly minor, details which are of great assistance to contemporaneous and future workers and tends to stabilize our nomenclature. With this in mind the Entomological Society of Washington has recently adopted the following rules and suggestions governing publication in their *Proceedings:*

Rule 1.—No description of a new genus, or subgenus, will be published unless there is cited as a genotype a species which is established in accordance with current practise of zoological nomenclature.

Rule 2.—In all cases a new genus, or subgenus, must be characterized and if it is based on an undescribed species the two must be characterized separately.

Rule 3.—No description of a species, subspecies, variety or form will be published unless it is accompanied by a statement which includes the following information, where known: (1) the type-locality; (2) of what the type material consists—with statement of sex, full data on localities, dates, collectors, etc.; and (3) present location of type material.

Rule 4.—No unsigned articles, or articles signed by pseudonyms or initials will be published.

Rule 5.—The ordinal position of the group treated in any paper must be clearly given in the title or in parentheses following the title.

Suggestion 1.—All illustrations, accompanying articles, should be mentioned in the text and preferably in places where the object illustrated is discussed.

Suggestion 2 —It is desirable in describing new genera and species that their taxonomic relationship be discussed, and that distinguishing characters be pointed out.

Suggestion 3.—In discussion of type material modern terms indicating its precise nature will be found useful. Examples of these terms are: type (or holotype), allotype, paratype, cotype, lectotype, neotype, etc.

Suggestion 4.—In all cases in the serial treatment of genera or species and where first used in general articles the authority for the species, or genus, should be given; and the name of the authority should not be abbreviated.

Suggestion 5.—Where the title of any publication referred to is not written in full, standard abbreviations should be used.

Suggestion 6.—When a species discussed has been determined by some one other than the author it is important that reference be made to the worker making the identification.

It is believed that nearly all workers will realize the importance of these or similar rules and it is hoped that other periodicals will carefully consider the matter and determine on definite policies. Such a step would be of great help to all workers and would assure a firmer foundation.

Rule 4 covers a subect which is often abused. When we consider that much of the cataloguing and indexing is now done by people with but little experience and knowledge, it is especially important that all communications should be properly signed.

S. A. Rohwer,
Corresponding Secretary-Treasurer

A NEW MARINE TERTIARY HORIZON IN SOUTH AMERICA

In preparing a monograph on marine Tertiary mollusca from the Lower Amazon region for the Serviço Geologico e Mineralogico do Brazil, we have been astonished to note that we are dealing with a horizon approximately equivalent to the blue marls of the Yaqui valley, Santo Domingo; the Bowden beds of Jamaica; the Gatun formation of the Isthmus of Panama, and the Chipola beds of Florida.

Carlotta J. Maury

Department of Paleontology,
Cornell University

THE PANAMA CANAL SLIDES THAT WERE

The big slides that blocked the Panama Canal after its opening were removed sufficiently about April 15, 1916, to permit ships to again use the waterway. The dredges continued at work, however, until they had not only brought the channel to its former size but, by April 1, 1917, had also made the part where maximum sliding occurred more than 200 feet wider than it was before the temporary stoppage of traffic. After January 1, 1917, only a little dredging was done, and by February 1, 1918, it was practically discontinued.

On August 30, 1916, a large bowlder slid into the channel and, because of its menacing position, caused navigation to be suspended until it could be blasted out. Because of its great hardness the rock was not completely removed until September 7, 1916. Since this 7-day interruption to navigation in 1916 the canal has given absolutely satisfactory and uninterrupted service.

Now that even dredging in the vicinity of the former slides, except a very little for general maintenance, has been discontinued for several months, it is interesting to recall an article published in the *New York Times* during the latter part of 1915, part of which follows:

> That uninterrupted service through the Panama Canal could not be expected for several years was the statement made last night by Professor Benjamin Le Roy Miller, Ph.D., who occupies the chair of geology at Lehigh University.

The article continues, quoting the professor directly:

> Before the canal can be said to be completed and permanently opened to traffic, the amount of material that must be taken out will not fall far short of the amount already taken from the Culebra cut.
>
> Transportation companies planning to use the canal should realize that they must not expect uninterrupted service for several years. During the dry season the canal may be opened, but it is certain to be closed during the rainy season when the earth is soaked with water and its movement toward the canal facilitated.

General Goethals, then governor of the Panama Canal, in his annual report for 1916

strongly condemns the professor's wild statements. The committee from the National Academy of Sciences, sent down by President Wilson about the end of 1915, also believed such assertions were not warranted by facts. Now the zephyrs of time have completely cleared away the foundations of fog on which the professor's off-hand, sweeping, and calamitous prophecy was based. One might pardon a professor of poetry for indulging in such dire and generalized prophecy regarding the canal, but that a professor of science should ascend so far into the rarified realms of imagination is surely an anomaly.

DONALD F. MACDONALD,
Formerly Geologist to the Isthmian Canal Commission

A COUNTRY WITHOUT A NAME

TO THE EDITOR OF SCIENCE: A statement made by one of your correspondents in SCIENCE, June 21, "Canada, which is no part of America," is barely saved by the context, "Canada, which is no part of America, as we wish it to be known, the U. S. A."

Wishes will hardly avail to rule that Canada is no part of America. The united states south of the Rio Grande bear the name Mexico; similarly the united states (provinces) north of the St. Lawrence and the Great Lakes bear the name Canada. Mexico and Canada are both good names, because they are single words and readily afford corresponding adjectives. The geographically intermediate group of states suffers the misfortune of having no name, and a much needed adjective is consequently lacking. All three groups are, of course, "of America"—Mexico being, however, rather more American than the other two.

The awkwardness due to lack of a name has been especially exhibited during the past year or more in such glaring inaccuracies as "American troops," "American supplies," etc., when "United States" is meant. That particular federation of American states which begins with Maine and ends with Washington needs a name more than it needs a national flower.

ELLEN HAYES

WELLESLEY, MASS.

SCIENTIFIC BOOKS

An Introduction to the Chemistry of Plant Products. By PAUL HAAS, D.Sc., Ph.D., Lecturer on Chemistry, Royal Gardens, Kew, and in the Medical School of St. Mary's Hospital, London; and T. G. Hill, A.R.C.S., F.L.S., Reader in Vegetable Physiology in the University of London, University College. With diagrams. Second edition. London, New York, Bombay, Calcutta and Madras, Longmans, Green and Company. 1917. $3.50 net.

The subject of paramount importance in biology is the study of the cell and its constituents. A great deal is known concerning the physical properties and occurrence of nearly all those bodies that possess definite forms under normal conditions. Independent of the biologist a large number of constituents have been isolated and these have been studied as to their chemical properties and in some instances their constitution has been ascertained. The work of the biologist and phytochemist has been usually conducted more or less independently. Up until now this was inevitable on account of the special training required in both these sciences. The time has come, however, when the results of the biologist should be understood by the chemist and the discoveries of the latter interpreted and applied to the study of the constituents of the cell. This work of Haas and Hill aims to supply this deficiency and is likely to be an incentive to the publication of other books covering these subjects.

This work deals essentially with the important plant constituents and includes: (1) Fats, oils and waxes; phosphatides; (2) carbohydrates; (3) glucosides; (4) tannins; (5) pigments; (6) nitrogens bases; (7) colloids; (8) proteins; (9) enzymes. These various substances are considered as to their occurrence in nature, their physical and chemical properties, microchemical reactions, method of extraction, quantitative estimation and physiological significance. The chemical methods of isolation of the plant products and their chemical reaction are very fully considered and for this rea-

son the work will be of special interest to the plant physiologist. The abstracts used in the preparation of the several monographs have been accurately prepared and the numerous citations to the original literature enhance the value of the work very much. If in courses of plant physiology it were required of the student to isolate all of these plant products it would add very much to the student's competence to deal with the nature of physiological processes and make this subject of greater fundamental value in its application to other phases of botanical work.

The second edition has been improved by re-writing the section dealing with the chemistry of plant pigments. This subject during the past few years has been the field of most interesting study by Willstätter and Miss Wheldale.

The value of the work would be much enhanced by a somewhat different arrangement of the subjects, particularly if they could be connected in their biological relations. To begin with "fats, oils and waxes," substances which are seldom studied in courses in either plant morphology or plant physiology, tend to discourage the use of the book by those for whom it would be a source of greatest benefit. On the other hand if a subject like the carbohydrates or pigments were first considered, both of which are under constant observation by the student of botany, it is quite likely that the chemical methods contained in the work would be applied in laboratory instructions. Furthermore the microchemistry of all of the plant products considered should be considerably improved upon. Many of the statements are only partly true; in others more pronounced reactions could be utilized while in still others a large amount of work should be included. To-day the interest in microchemistry or chemical microscopy is very great and with the appearance of such excellent works as those of Chamot, Molisch and Tunnmann there is an excellent basis in a work of this kind to connect the morphology of plants with the chemistry of the constituent and to follow physiological processes with microchemical reactions.

Henry Kraemer

June 1, 1918

SCALARIFORM PITTING A PRIMITIVE FEATURE IN ANGIOSPERMOUS SECONDARY WOOD

Professor Jeffrey, in his recent stimulating book, "The Anatomy of Woody Plants," Ch. VII., derives the vessel with the simple or porous type of perforation from the fusion of horizontal rows of circular pits in the end-wall, the scalariform pit and perforation being merely an intermediate stage in the process. Perhaps such a reversible evolution has gone on in certain groups, although it is here attempted to show that the available evidence is capable of the opposite interpretation.

Multiperforate and even uniperforate end-walls in gymnospermous vessels may arise from the fusion of circular pits with the dissolution of the closing membrane as Professor Jeffrey describes for *Ephedra;* but this fact seems inadequate to explain either the presence of scalariform pitting or the wide prevalence of scalariform perforations in the vascular elements of the less specialized angiosperms. It does not appear that all of the facts germane to the subject have been fully considered. In tracing out the development of vascular elements with uniperforated end-walls in accordance with Jeffrey's hypothesis, serious difficulty is met.

The scalariform pits in conservative regions of the secondary wood of *Liriodendron, Drimys, Asimina,* and other forms with prevailing circular pits in the less conservative regions, suggest antecedence of the scalariform condition, while a further illustration is afforded by the monocotyledonous *Dracæna.* Thus, in *Dracæna aurea,* typical secondary xylem without vessels is formed, the fibro-tracheids of which have circular pits in their lateral walls, but typical scalariform pits in the walls of the overlapping tracheid ends. There is no indication that such scalariform pits have arisen from the fusion of rows of circular pits. They are evidently a primitive feature of the tracheid and closely resemble the scalariform pits of the secondary wood tracheids of *Drimys* found in the vicinity of the pith; yet only a slight modification of the tracheids, with dissolution of the closing membranes and borders of the scalariform pits, would com-

plete transformation into typically perforated scalariform vessels.

It is evident that, to the extent that adjacent cells become specialized, and unlike in shape, in size, and in function, as, for example, the tracheal segment and an adjacent prosenchyma cell of the angiosperms, the scalariform pit must lose its alignment as an intercommunicating structure. Conversely, the circular pit is the more adaptable, and prevails in the vascular elements of more advanced plant families as typified by the Compositæ. Just as might be hypothesized, the scalariform pit is relatively more common in the vascular elements of less specialized families included in the Ranales. Probably the scalariform pit prevailed in the early angiosperms, and is even now being slowly discarded for the smaller circular pit. It was, in case of the vessels, first discarded on the lateral sides adjacent specializing tracheids, ray-cells, wood-parenchyma, or, especially, fibro-tracheids and fibers. The close relation between a vessel and the adjacent element or elements is evident from the fact that, for example, in *Cheirodendron* (Araliaceæ) four distinct types of pits communicate respectively with prosenchyma, wood-parenchyma, ray-parenchyma, and with other vessels. However, that the end-walls should preserve the more primitive sculpture is quite in harmony with the fact that adjacent cells are, in this case, alike. Complex modification is here unnecessary, and adequate comparisons of the secondary wood of existing *primitive* and *specialized* families proves the correctness of the view advanced. It is indeed a remarkable fact that in woods with scalariform perforations in the vessels, the prosenchyma usually bears distinctly bordered pits and is thus less distinct from the tracheal segment than in case of woods in which the vessels are characterized by the simple or porous perforations.

A feature of interest not mentioned by Jeffrey is the more or less frequent occurrence of branched bars. They occur occasionally in *Liriodendron* and other genera with scalariform perforations; but in *Cheirodendron* and some other araliaceous woods this branching of the bars in the perforation may become more or less intricate.

Comparison of such types with the scalariform wood of *Cycadeoidea Dartoni* has been suggested by Dr. Wieland, and for the purpose he has placed before me recently cut sections. The preservation of this fossil is perfect. The sections show the minutest detail in the pitting of the tracheids, even under a magnification of 450 diameters. The outline of the pits, the pit-apertures, and other minute characters are preserved in every detail. The sides and ends of these tracheids, in both tangential and radial aspects, are pitted with regular scalariform bordered pits, which at once remind one of those of *Magnolia*. Along with the true scalariform pits occur a few elliptical pits, and these are inserted between the long pits in such a manner that, by the dissolution of the borders and closing membranes, occasional branched bars would result. The resemblance between the pitting of these cycadeoidean tracheids and the vascular elements of *Magnolia* on the one hand, and of *Dracæna* on the other, is perfect, and may be followed out in minute detail.

The evidence in support of the hypothesis that scalariform pitting is primitive is convincing. It is evident that the process of the breaking up of scalariform pits into circular pits was in progress in the antecedent cycads, and that this process started first in the tracheid side-walls, whereby the overlapping tracheid ends became more conservative than their truly lateral portions. The complementary relations in the wood of the cycadeoids and cycads outlined in Wieland's recent note[1] are thus anatomically reconciled. The origin of branched bars is also explained.

Excellent examples to show that perfect scalariform tracheids exist in living types occur in *Magnolia hypoleuca*. The scalariform pitting very closely approximates that of *Cycadeoidea Dartoni*. Scalariform tracheids slightly more advanced may be found in the aquifoliaceous *Byronia sandwicensis* Endl. Here the tracheids retain typical sca-

[1] Wieland, G. R., Feb., 1918, "Cycadoid Wood Structure," *Science*, N. S., XLVII., pp. 141, 142.

lariform bordered pits at the overlapping ends, with the exception that occasional shorter pits are present and in a position to form branched bars should the pit membranes and pit borders be eliminated. The lateral walls show perfect transition from scalariform to circular pits. Living types, therefore, preserve all stages in the transformation of scalariform tracheids into vessels with multiseriate circular pits and simple perforations; and there is every reason to believe that modification is still going on.

Many seem to be under the impression that scalariform pitting is of rare occurrence above the cycads. A close comparison of scalariform tracheids, which Wieland's material makes possible, can leave no doubt that existing forms, in dicotyledons as well as in monocotyledons, still exhibit, in the vascular elements of their secondary wood, almost complete stages in the transformation of scalariform pitting into that of the circular multiseriate type, affording a valuable criterion by which to judge the relative primitiveness of angiosperm groups. The histologic evidence is fairly in accord with the floral evidence.

The exceptional abundance of circular pits in such forms as *Vaccinium corymbosum*, noted by Jeffrey, is accentuated by the fact that, in this type, the vessels are mostly isolated from one another and in contact with wood-prosenchyma which forms circular bordered pits in common with the vessels. Scalariform pitting occurs near the pith where, occasionally, vessels are adjacent. Here occur vessels showing perfectly the transition from scalariform pits to scalariform perforations, as well as the transition stages, noted by Thompson,[2] from scalariform to simple or porus perforations.

Forest B. H. Brown
Osborn Botanical Laboratory,
Yale University

THE ORIGIN OF DICOTYLS

It is generally conceded that the origin of the conifers is from the evolutionary point of view a fairly luminous subject. Neither stem, leaf nor cone has wholly new or remote features. The group appears rather old mainly because so much of its history is known or directly inferable. Evidently, sporophyll consolidation into the hard spiny unisexual cones mainly occurred in the Permian, and by Jurassic time was complete. There is, thus, the distinct connection with the dominant Cordaites of the ancient world, and the cycads and *Ginkgo* amongst still existent types. Moreover, that *Ginkgo* was cosmopolitan, and of varied form in the Rhätic further broadens the possibilities of conifer relationship with known types, while by way of seed-ferns the several gymnosperm lines are in common carried back to Pteridophytes.

Not so the origin of dicotyls, long wholly without the range of scientific discussion. It was understood in a general way that the monocotyls did not obscure the problem. That they were either a contemporaneous or later development appeared more or less certain. Before the discovery of the cycadeoids, however, no line of attack from the viewpoint of either fossil or existent evidence seemed to carry the dicotyls beyond the Cretaceous. Back of that period the decipherable record ceased entirely. But the discovery that the cycadeoids were a varied group with flowers recalling those of magnolias, at once suggested that the origin of the dicotyls could not be wholly obscure. It was soon seen that the great extension of Magnoliaceous species in the lower Cretaceous must indicate a series of more primitive magnolias in the Jurassic. There might have been doubt as to the significance of the cycadeoid flower with its pollen-bearing synangium. But the reduced sorus of existing cycads plainly stood in the complementary relationship, just as did the cycadeoid microsporophyll and the carpellary leaf, as components of cycad fructification.

Nextly it was found by Nathorst and Wieland that the larger proportion of Mesozoic cycadales were cycadeoids, in part bearing small and reduced types of flowers. The *Wielandiella* of Nathorst with its slender bifur-

[2] Thompson, W. P., Jan., 1918, "Independent Evolution of Vessels in Gnetales and Angiosperms," *Bot. Gaz.*, LXV., pp. 89-90.

cating stems and Nilssonioid foliage proved the form of greatest interest; although very recently another related form, *Williamsoniella*, of quite equal interest from the Yorkshire coast has been reconstituted by Thomas. This has a very small perfect flower with somewhat scale-like microsporophylls, bearing, as it turns out, only a few pairs of sessile synangia. The stems are slender, and the foliage definitely Nilssonian to Tæniopterid This relationship was in *Wielandiella* somewhat obscured by a peculiar prolongation of the midrib.

Now this definite inclusion of *Nilssonians* amongst the small-flowered cycadeoids demonstrates the presence of a great alliance related to the primitive magnolias and abundantly represented in the leafy records of the Mesozoic. For it is seen that to this group must be added not only *Tæniopteris* but *Macrotæniopteris* at least in part. In 1905 I called attention to these foliar types in Monograph XLVIII. of the U. S. Geol. Sur. in the following justifiable terms:

> The genera *Nilssonia*, *Tæniopteris* and *Oleandridium* have now come to comprise numerous species of a very generalized and cosmopolitan type of leaf. As a consequence, it has become difficult, as always in such a case, to say definitely, in the absence of extended revision, where the one genus ends and the other begins. Nevertheless we have every reason to believe that at the one end of the series there are characteristic ferns analogous to such living forms as *Oleandra* and *Acrostichum*, as well as marattiaceous forms, and at the other an important list of cycadaceous forms. The closely related genera *Pterophyllum* and *Anomozamites* [now *Wielandiella*, in part] may be cited here. *Anomozamites minor* (Brongn.) Nath., as restored by Nathorst from specimens from the Rhätic of Scania, with its *Williamsonia*-like fructifications, *Nilssonia*-like foliage, and branching habit, is especially to be mentioned in this connection as one of the most interesting fossil plants known. This series is at the same time an exceedingly important one, covering as it does a period extending over much of the Paleozoic to the close of the Jurassic at least, a period so fertile in the evolution of higher forms.

From the Carboniferous to the Cretaceous there is, then, a great and cosmopolitan cycadeoid group with simple sparsely inserted leaves. This group is especially in evidence in the Rhätic, a period of marked change in the Mesozoic plant alignment. In the Northern hemisphere the Rhätic is generally notable for megaphyllous forms, especially so in the Richmond and North Carolina coal fields; but, as I found on the eastern side of the Andes in finely stratified Rhätic shales of Argentina, there are many small leafed and even scrub or upland forms. The small extent to which these forms showed netted venation is of course the weakest link in the chain of evidence for dicotyl derivation. But it may be recalled that the presence of net-veined forms [*Dictyozamites*] is not an inference; while the perfunctory reference of the numerous net-veined leaves of the Mesozoic to ferns, rarely found fertile, rests on no sound or certain basis. The great lyrate ferns of the Rhätic, *Clathropteris* and *Dictyophyllum*, are an exception; also an adumbration of the higher net-veined types soon to become dominant.

This subject has been considered more at length in a paper in the *American Journal of Science* (November, 1914). It is there suggested that polar stocks of unknown record may account in part for the seeming gap in the dicotyl leaf series. Also it should be noted that plastic, potent upland stocks (Bailey and Sinnott), are in the strictest sense of the word corollary to the main theory of radiation of animals and plants from the polar areas (Darwin, Forbes, Rütimeyer, Saporta, Joseph Dalton Hooker, Asa Gray in the Dubuque Address of 1875, Narthorst, Wallace, Scribner, Wortman, Wieland and Matthew). In any case the negative evidence indicates small flowers for the early dicotyls from the Permian on, and these are only likely to occur in some favored or unusual locality.

It has been said that the resemblances between Cycadeoid and dicotyl wood structure are deceptive, that some Magnolias (and the Trochodendrons) *have lost their vessels*, and that scalariform sculpture of the dicotyledonous vessel results from the lateral *fusion of circular pits* (Jeffrey). Even if the first of these contentions, improbable as this now seems,

were true, it no longer need be held vital. The second has been fully and thoroughly shown by Brown to be at variance with the facts. By the simple process of segmentation of the primitive and more fern-like scalariform pits, the circular-pitted and slit-pitted modern types of vessels must arise. When the scalariform cycads and the *Araucaria,* and Magnoliaceous (*Drimys*) seedlings are adequately compared, every stage in this fundamental change, which affords the very basis of dicotyl evolution, becomes visible.

Over and above the collateral evidence now at hand, three notable generalizations of the last few years further affect our conceptions of the fossil record of the dicotyls:

Firstly, there is a very small record of the upland vegetation of past times; although the enormous extent of the unknown upland record could not be surmised so long as the alternate emergence and subsidence of the continental areas remained wholly unmapped. Yet it appears that the high upland and polar, and not the tropic or coastal fringe plants have long included the great majority of plastic forms; and it is certain that upland and polar forms moved forward during the periods of continental emergence closing geologic epochs, and were least liable to extinction during medial subsidence. That is to say, we know best the aplastic coastal fringe forms with a broken record.

Secondly, the fossil record has gradually lengthened out in the case of so many lines both animal and plant, that a nearly universal parallelism comes into view instead of a comparatively recent development from constantly dichotomizing stocks. That is, slowly converging lines replace the "paleontologic tree" of the texts; and now that these persistent lines are more clearly discerned they are rapidly being pushed back still further on purely anatomical grounds. Thus it is not only easy to admit the view of Seward that the Araucariales are distinct, but it now seems difficult to show the connection of any of the gymnospermous groups since Carboniferous times. Their resemblances are all in large degree homoplastic.

Thirdly, Bailey has found much evidence for a progressive tracheidal shortening in all woody plants from the Carboniferous on. His fuller results are awaited with the greatest interest. The wonder is that it was not discerned long since that some such general course of change formed the basis of later stem evolution. Now this leads to a very obvious conclusion as to the origin of complexity of structure in dicotyledonous stems. Taking into consideration the observations already made as to the tracheidal origin of vessels, and the general dicotyl stem features, it seems that the main order of dicotyl stem change has been, beginning some time in the Permian: (*a*) shortening of the tracheids, (*b*) segmentation of scalariform into circular pitting, (*c*) pith reduction and development of both medullar and radial storage tissues, (*d*) secondary [relative] enlargement of short types of circularly pitted tracheids coordinate with [actual] reduction of adjacent elements to the condition of fiber tracheids, (*e*) progressive radial sclerotization, (*f*) development of extreme branching in sparse-leafed shoots. In recent interesting and serviceable descriptions of Lower Cretaceous woods by Stopes[1] exactly the older features agreeing with the course of change just outlined are sharply in evidence. In the Lower Cretaceous *Aptiana* the *small vessels* scarcely disturb the regular radial sequence, are little larger than the wood fibers, and nearly as elongate as normal tracheids. The medullary rays are similarly old of aspect, with considerable variation in cell length and size, the short rectangular form being almost cycadeoid. Fully in accord with the views advanced, scalariform wood is a striking feature in not only *Aptiana,* but several other Lower Cretaceous genera described by Stopes.

Morphologically speaking a point has therefore been reached where dicotyls are no more isolated than the conifers. From the viewpoint of stem, foliage and flower they are separated from other groups by no impassable gap. In fact the main categories of evidence for dicotyl origin are to be found within the

[1] *Brit. Mus. Cat. Mesozoic Plants,* 1915.

dicotyls themselves. Among various dicotyls, which have a Lower Cretaceous record and numerous present representatives, are not only the Magnoliaceæ and Trochodendraceæ, but Berberidaceæ, Myricaceæ, Salicaceæ, Fagaceæ, Moraceæ (figs), Lauraceæ, Myrtaceæ (*Eucalyptus*). The list might be greatly extended. As a clue to the nature of the real early characters of dicotyls attention may be turned to the sassafras, poplars, elms, oaks and magnolias, all typical in the Comanchian. All these must show recognizable archaic characteristics in the seedlings; and in making comparisons with gymnosperms, *Araucaria* and the cycads afford just as critical data as the cycadeoids.

G. R. WIELAND

YALE UNIVERSITY

SPECIAL ARTICLES

THE REGULATION OF BLOOD VOLUME AFTER INFUSIONS OF SOLUTIONS OF VARIOUS SALTS. PRELIMINARY NOTE

IN the recent work of Rous and Wilson[1] it was demonstrated that the disastrous effects of hemorrhage are not the result of the withdrawal of hemoglobin from the circulation. They bled an animal until the hemoglobin was reduced from 80 per cent. to 20 per cent., *i. e.*, three fourths of the original hemoglobin of the animal was removed without consequent serious effects. A reduction of four fifths, however, resulted in a somnolent, torpid condition, followed by death. Under the conditions of severe, sudden hemorrhage observed in man, the hemoglobin content is never reduced as much as these authors report.

Bayliss[2] has shown that the factor which makes the results of sudden hemorrhage severe is the lowered blood pressure consequent to the reduction of volume of fluid in the circulatory system. Bayliss and Rous and Wilson state that saline infusion is almost useless in sustaining blood volume; and Bogert, Mendel and Underhill[3] have shown in what a surprisingly short time infused saline solution leaves the circulation. Bayliss reports satisfactory results in sustaining blood volume when colloidal solutions of approximately the same viscosity as blood are used as infusion fluids. He used 6 per cent. gelatin or 7 per cent. acacia in Ringer's solution. Rous and Wilson have used the same solutions with the same satisfactory results. They also have used human plasma and horse serum. Human plasma has given them their best results. They dispute Bayliss's contention that the infusion fluid must have the same viscosity as blood. Hurwitz[4] has used Locke solution containing 5 per cent. acacia for infusion in human patients and reports satisfactory results.

In the course of some experiments of a somewhat different nature, the writer has had occasion to measure the rate of disappearance from the circulation of various isotonic solutions, each containing the same cation but a different anion. In view of the timeliness of this question of maintenance of blood volume, it seemed worth while to offer at this time what information was available which had a bearing on this problem.

The solutions examined were isotonic with rabbit's blood. The bromide, nitrate, acetate, chloride, sulfate and thiocyanate of sodium were the salts used. These solutions were injected into the jugular vein of rabbits which had been anesthetized with ether. Blood samples were taken from the carotid and the dilution of the blood after injection was followed by the hemoglobin percentage, using the Haldane technic. Fifty cubic centimeters per kilo body weight, or the approximate blood volume, was injected in two minutes. The average time for the blood volume to return to normal after the injection was less than an hour for every salt used except one. This exception was the sulfate. When this salt was used the blood volume did not return completely to normal during the entire experiment. The amount of infused fluid which remained in the circulation was about 9 per cent. of the amount put in.

[1] Rous and Wilson, *Jour. American Medical Association*, 70, 219.

[2] Bayliss, *Proc. Royal Society*, 89, 380.

[3] Bogert, Underhill and Mendel, *Am. Jour. Physiology*, 41, 189.

[4] Hurwitz, *Jour. American Medical Association*, 68, 699.

We can, then, confirm the results of Bayliss, Hurwitz and Rous and Wilson with chloride infusion; our experience supplements these in showing that, in so far as the bromide, nitrate and thiocyanate of sodium are concerned, the use of them in infusions after severe hemorrhage would probably be of little permanent value in maintaining normal blood volume. Furthermore, it is probable that employment of sodium sulfate, even in combination with colloidal substances, will prove little more efficacious than Ringer's solution.

Arthur H. Smith

Yale University

THE IOWA ACADEMY OF SCIENCE

The Iowa Academy of Science held its thirty-second annual session at the Iowa State College at Ames, beginning at 1:30 P.M. on Friday, April 26. After the general program in the Assembly Room sectional meetings were held for the reading of papers of special interest and these were resumed on Saturday morning. The general business meeting was held on Saturday morning at 11 o'clock. Dean E. A. Birge, of the University of Wisconsin, gave the annual address at 8 P.M. Friday, on "The warming of an inland lake." The Iowa Section of the Mathematical Association of America and the Ames and Iowa Sections of the American Chemical Society held their meetings in connection with the sessions of the Academy. President Ross delivered his presidential address on "The history of the teaching of science" at the general meeting on Friday afternoon.

At the business meeting on Saturday morning the following officers were chosen for the coming year:

President—S. W. Beyer, State College, Ames.

First Vice-president—T. C. Stephens, Morningside College, Sioux City.

Second Vice-president—R. Monroe McKenzie, Parsons College, Fairfield.

Secretary—James H. Lees, Iowa Geological Survey.

Treasurer—A. O. Thomas, State University, Iowa City.

Resolutions were passed endorsing the national administration, also calling for the selection of scientifically trained men to the position of fish and game warden and on the Board of Conservation.

TITLES OF PAPERS

Physics and Psychology

Temperature-time relations in canned foods during sterilization: George E. Thompson. Certain well-known mathematical formulæ are applied to heat penetration into foods packed in cylindrical cans. It is found that if the diffusivity of the food be known the temperature-time curves may be constructed with a fair degree of accuracy for cans of any size and for any practical temperature range. A number of experimental and theoretical curves are shown for squash and corn.

(a) Some structural features of selenium deposited by condensation from the vapor state above the melting point. (b) The sublimation curve for selenium crystals of the hexagonal system: L. E. Dodd.

Stroboscopic velocities in the tonoscope: H. R. Fossler and L. E. Dodd.

The eclipse expedition to Matheson, Colorado, June 8, 1918: D. W. Morehouse.

The X-ray spectrum of tungsten: O. B. Overn.

A new principle in the design of rheostats of large capacity: H. L. Dodge.

On the coefficient of absorption of photoelectrons in silver and platinum: Otto Stuhlmann, Jr.

On the production of opaque and the color of transparent and semitransparent metallic films: Otto Stuhlmann, Jr.

Hall effects in thin silver films: G. R. Wait.

The effect of pressure upon the conductivity of selenium: E. O. Dieterich.

The measurement of basic capacities in motor ability: Carl E. Seashore. The speaker reported having devised and standardized a series of seven tests for the measurement of the basic forms of motor capacity. These are (1) motor ability, (2) timed action, (3) a simple response to a simple signal, (4) a simple response to a complex signal, (5) a complex response to a complex signal, (6) precision in action—direction, time, distance and force, and (7) strength and endurance.

He also reported having devised simplified forms of instruments for these measurements. The time measurements are all made by means of small attachments, used on a phonograph. The complex reaction to a complex stimulus (chain reaction) is made by means of a carrier contact to a typewriter; and the strength and endurance test is made by means of a new form of ergograph, taxing the muscles of the forearm.

Zoological and Allied Subjects

(a) Bird records of the past winter (1917–1918) in the upper Missouri valley. (b) A note on molluscan behavior. (c) Birds of Union county, South Dakota: T. C. STEPHENS.

An unusual example of incisor growth in the western fox squirrel: DAYTON STONER.

Pharyngeal derivatives of Amblystoma: FRANCIS MARSH BALDWIN. This paper deals with the morphogenesis of the thyreoid and thymus glands, the postbranchial and epithelial bodies of *Amblystoma*, beginning with larvæ 5 mm. long, and including stages in metamorphosis and adult. The thyreoid gland arises as a solid outgrowth from the pharyngeal floor and breaks up into scattered cells, which, by mitotic division, give rise to the thyreoid follicles, in which colloid appears in late larvæ. There is no evidence of the formation of accessory thyreoids. The thymus gland arises from five pairs of anlagen, derived from the dorsal margins of the corresponding gill pouches. The anterior two degenerate, the other three form the definitive organ. There are no ectodermal contributions to the gland. The postbranchial body arises from a thickening of the pharyngeal floor, behind the last gill-pouch. In all cases, with one exception, it was asymmetrical. At the time of metamorphosis two pairs of epithelial bodies arise from the ventral parts of the last two gill pouches. They are the homologues of the parathyreoids of the mammals.

Economic entomology and food conservation: R. L. WEBSTER.

A list of the birds found in Marshall county, Iowa: IRA N. GABRIELSON.

Notes on a wood borer: H. E. JAQUES.

The influence of floods upon animals: D. M. BRUMFIEL. This paper is an analysis of the ways in which floods may affect animal life based upon observations made along Whitewater river in Fayette county, Indiana. Floods affect animal associations in two general ways, viz.: (1) by changing the habitats topographically, and (2) by changing the composition of the association without affecting the physical habitat.

Topographical changes may be brought about as follows: (1) the course of the stream may be directly altered, (2) the local character of the stream may be altered, (3) changes may be brought about in the flood plain.

Floods influence associations directly by: (1) destroying or removing forms already established and (2) providing a means of dispersal.

The life and behavior of the house spider: H. E. EWING. Although the common house spider, *Theridion tepidariorum* K., is one of the most common arthropods observed about our houses no one in the past appears to have made a systematic and thorough study of its life and behavior.

The complete life history is given, and observations extending over a period of several years are here reported. Scores of individuals were observed daily for many months both in captivity and in their natural environment. The cocooning process is described and illustrated by figures. Notes on courtship, cannibalism, food habits, emotions, instincts and intelligence are given.

A preliminary list of the Acarina of Iowa: ALBERT HARTZELL. But few lists of *Acarina* have been made in this country. In 1886, Professor Osborn and Professor Underwood published a preliminary list of the *Acarina* of North America. This list included 99 species and 28 genera. In the Iowa list here given 75 species and 55 genera are included.

The mite fauna of Iowa is in general very similar to that of Illinois, yet it is interesting to note that in the vicinity of Ames we find several of the northern forms. No records of sheep scab or human scabs have been noted in recent years. Sheep scab at one time occurred in this state, but due to the efficient work of the United States Bureau of Animal Industry it apparently has been eradicated.

Notes on the food of the yellow perch in Cayuga Lake: W. A. HOFFMAN. This paper consists of preliminary work relating to the food of the yellow perch, *Perca flavescens* Mitchill, which was done in the limnological laboratory of the department of entomology at Cornell University.

Twenty-one fish were seined on two days, June 25 and July 14. An examination of the stomach contents of these perch was then made. Crustacea, fish and fish eggs were found in the greatest numbers and volume. Of the Crustacea, Decapods represented by *Cambarus* were present in eight stomachs, while Amphipods which consisted mostly of *Gammarus* and *Hyalella* were in ten. Chironomids, Trichoptera and Odonata made up most of the insect food. Only two Ephemerida were found, whereas these insects often are the only food to be found in the perch. The remainder consisted of Gastropoda, Hydrachnida and Entomostraca.

The cranial nerves of the dogfish: SALLY P. HUGHES.

Spiders of the family Attidæ collected in the vicinity of Ames: I. L. RESSLER.

Botany

The white waterlily of McGregor, Iowa: Henry S. Conard.

The classification of plants: Henry S. Conard.

(*a*) *An unusual black walnut.* (*b*) *An annual sweet clover.* (*c*) *Notes on the perennial mycelium of a few parasitic fungi:* L. H. Pammel. Calls attention to the perennial mycelium of *Ustilago striæformis, Plasmopara Viticola, Urocystis Agropyri.*

An ecological study of the weeds of some Iowa fields: R. S. Kirby. The relation of weight and number of weeds to soil moisture and rate of growth of crops with their weight.

The germination of some native Iowa and exotic tree seeds: L. H. Pammel and Charlotte M. King. A continuation of the studies presented last year on the germination and juvenile conditions of some Iowa oaks. This study considers the germination and morphology of *Juglans, Carya, Fraxinus, Tilia, Acer* and *Pyrus.*

The vegetative organs of some perennial grasses: Florence Willey. It is often difficult to recognize grasses when they are in their vegetative condition. This study considers the rhizomes and early leaf and culm characters of such grasses as *Spartina cynosuroides, Muhlenbergia mexicana, Phragmites communis, Poa compressa, Agrostis alba, Bromus inermis, Agropyron repens, Agropyron Smithii* and *Sporobolus cryptandrus.*

Some anatomical notes on the plants of a prairie province: Ada Hayden. The study includes a discussion of the comparative anatomy of plants in dry situations like *Petalostemon violaceus, Liatris, Aster lævis, Gentiana puberula* and in moist situations and swamps of such plants as *Scirpus fluviatilis, S. validus, Sagittaria* and *Phragmites.*

Some phenological records of spring flowering plants of Henry county: H. E. Jaques.

The fern flora of northeastern Iowa: T. J. Fitzpatrick. This paper gives an enumeration of thirty-three species of ferns and fern allies occurring in a region of Iowa which is of great botanical interest. Each species listed is accompanied by notes on occurrence, habitat, frequency, distribution, etc.

The pollen and pistil in relation to the germination of the pollen in five varieties of apples: John N. Martin. This report deals with the conditions that control the germination of pollen, the structure and function of the stigma as related to the germination of the pollen, and the external factors that may hinder the efficiency of pollination.

The structure of the seed coat and its relation to the germination of the seeds of the two common sweet clovers: John N. Martin. This reports the results of investigation on the structure of the seed coat with the aim of determining the difference between the structures of the seed coats of hard seeds and soft seeds and just what structure prevents the entrance of water in case of hard seeds.

Cytological study of the abortion of the pollen in the Winesap: John N. Martin. This variety of apple in Iowa often fails to produce good pollen. The abortion of pollen in plants is considered indicative of hybridism. The aim of this work on the Winesap was to trace cytologically the steps in the abortion of pollen from the mother-cell stage until the flowers were mature.

The endosperm of Utricularia: Robert B. Wylie and Alice Yocom.

A miniature Vallisneria: Robert B. Wylie.

Notes on an introduced woodland flora: R. I. Cratty. An artificial grove planted in Emmett county in early days was left in such condition that an interesting woodland flora was introduced.

A study in cereal roots: R. O. Westley and A. L. Bakke.

Pioneer plants on a new levee IV: Frank E. A. Thone.

Eradication of the Barberry in the spring wheat sections of the United States with special reference to Iowa: I. E. Melhus.

Plants of southeastern Alaska: J. P. Anderson. This gives a systematic list with notes of about 425 species of plants collected in southeastern Alaska, mostly in the vicinities of Sitka and Juneau, during the years 1914 to 1917 inclusive.

(*To be concluded*)

James H. Lees,
Secretary

SCIENCE

A Weekly Journal devoted to the Advancement of Science, publishing the official notices and proceedings of the American Association for the Advancement of Science

Published every Friday by

THE SCIENCE PRESS

LANCASTER, PA. GARRISON, N. Y.

NEW YORK, N. Y.

Entered in the post-office at Lancaster, Pa., as second class matter